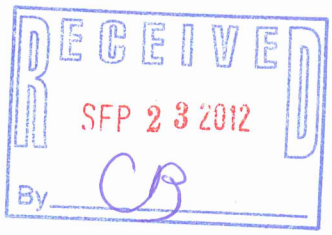
The Boeing Company
Santa Susana Field Laboratory
5800 Woolsey Canyon Road
Canoga Park, CA 91304-1148

Via e-mail




September 19, 2012
In reply refer to SHEA 112434

Mr. Mark Malinowski, P.G.
DTSC Performance Manager – SSFL
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

Subject: Department of Toxic Substances Control Comments on the Draft In-situ Chemical Oxidation Work Plan Addendum for Santa Susana Field Laboratory, Ventura County, California

Dear Mr. Malinowski:

The Boeing Company has reviewed comments that the Department of Toxic Substances Control (DTSC) provided on the In-situ Chemical Oxidation Work Plan Addendum *(MWH – January, 2012)*, in an email from Roger Paulson dated April 24, 2012.

The attached document summarizes the comments provided by DTSC and Boeing's responses. Boeing would like to implement this field program as soon as possible, so please let us know if there are any further comments that need to be addressed, or if the work plan is approved.

Regards,

Michael O. Bower, P.E.
The Boeing Company

MOB:jag

Cc: Roger Paulson, DTSC
Richard Andrachek, MWH
Kevin Murdock, CH2M HILL

**Draft DTSC Review Comments & Responses**
**In-situ Chemical Oxidation Work Plan Addendum**
**Santa Susana Field Laboratory**
**Ventura County, California**

| # | Sect/ Fig/ Tbl | Location | Comment | Response |
|---|---|---|---|---|
| 1 | 2.3 | Page 2-3 Item 1) | DTSC would like to see testing performed for DNAPL in RD-35A after it is re-drilled and prior to conducting the test injections. This may be a good application for utilizing the Sudan IV shake kit on a water sample collected from the bottom of the corehole. | As requested, the facility will collect a water sample from the bottom of the corehole after it is deepened and evaluate the presence of DNAPL as DTSC has proposed. |
| 2 | 2.3 | Page 2-4 Item 1) g. | Mud-rotary drilling methods are proposed for deepening of RD-35A. The drilling fluid is to be thinned-out in the hole, but some will likely be forced into the fractures below the target casing depth.<br><br>Verify that the completed injection well will be fully developed to remove drilling fluid that may have moved to the fractures or onto the fracture walls. | The injection well will be developed as outlined in section 7 of the monitoring well installations standard operating procedure. As an overview, wells will be developed using methods that include bailing, swabbing, and pumping or air lifting. Water quality parameters including temperature, specific conductance, turbidity, and pH will be measured during air lifting or pumping of the hole. Development will continue until three successive parameter measurements have stabilized within 10 percent where possible. |
| 3 | 2.3 | Page 2-4 Item 1) g. | Please present a discussion of the viscosity of the grout being used to seal the casing. How deep will it advance in the fractures and potentially seal them off?<br><br>Care should be taken so that the K around the injection well is not reduced. | Consistent with the monitoring well installations SOP, Portland cement (Type II) mixed with between 5 and 6 gallons of water per 94-pound bag of cement will be used for grouting. If additional water needs to be added, it will be metered in at the site up to the maximum ratio of 7 gallons per sack of cement. Powdered bentonite will be added to the grout mixture at no more than 5% by weight. Grout shall be emplaced via a rigid grout pipe from the bottom of the conductor casing to the top of the borehole. Cement grout mixtures for conductor casing installation shall conform to the requirements of California Water Well Standards for grouting. No additional additives or borehole cuttings will be mixed with the grout. |
| 4 | 2.3 | Page 2-5 Item 1) l. | Considering that a constant head injection test is being conducted to determine the injection interval, DTSC would like to see the test run extending to evaluate if other wells will respond to the influence of the injection system.<br><br>Of particularly interest are RD-73 and C-1 which are on the other side of the IEL fault. The monitoring wells should be outfitted with transducers to look for hydraulic response to injection. | The sole objective of the constant head injection test is to ensure that the interval selected for placement of the potassium permanganate solution has sufficient transmissivity to accept the targeted injection rate. Hydraulic connectivity across the IEL fault will be revealed during the field experiment as evidenced by permanganate or other geochemical arrivals. The two wells identified in this comment are included in the proposed monitoring program. |

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|---|---|---|---|---|
| 5 | 2.3 | Page 2-6 Items 3) h. and 4) | The two proposed monitoring wells and C-10 will have 10 port FLUTe liners installed, with the port locations determined from logging. Well logs can indicate where the fractures are, but not which fractures are hydraulically connected to the injection well. If the wrong fractures have are chosen for monitoring, then the test data may not correctly document the performance of the test.<br><br>Prior to selecting monitoring port locations, DTSC would like to see the application of one or a combination of techniques to better design the FLUTe observation wells, including:<br>• cross-hole flow logging;<br>• temperature profiling; and<br>• tracer testing. | Concur, these and/or other similar activities will be conducted as part of a scientific research endeavor within this area. |
| 6 | App A | General Comment | The modflow run was conducted under steady-state conditions. It would have been more appropriate to conduct it under transient conditions with the injections performed at a 8 hours per day program. The rise in the water level and the radius of influence are likely exaggerated.<br><br>An injection test will be performed on the newly installed well, but it is reasonable to get as good of a numerical simulation as possible for evaluating the performance of the injections.<br><br>It is also reasonable to add in the IEL fault (higher K) into the model domain since C-1 and RD-31 (monitoring wells) are essentially located on this structure. | The sole purpose of conducting the simulation was to gain insight and understanding as to the magnitude of "draw-up" that might be expected from potassium permanganate injection as a function of formation transmissivity and believe that the simulation as presented has provided such insight. Actual draw-up and permanganate delivery will be monitoring during the field experiment as described in the work plan and addendum. |

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| 7 | App D | General Comment | The Ogden (Sep 1996) IDW SOP appears to be more comprehensive the MWH (Jan 2010) IDW SOP. Although the MWH (Jan 2010) IDW SOP contains similar contents/information as the Ogden (Sep 1996) IDW SOP, the Ogden (Sep 1996) IDW SOP is presented in a more detailed and user friendly format.<br><br>Please consider revising the MWH (Jan 2010) IDW SOP to follow the format of the Ogden (Sep 1996) IDW SOP. | A revised IDW SOP was provided with the Gold Copy GIS update (SOP #12, Rev No. 1, April 2012) that likely addresses this comment. Handling of IDW associated with the ISCO work plan addendum will be conducted in accordance with the referenced revision described here. |
| 8 | App D | Section I.B, last sentence. | It is not clear who is to fill out the labels in this situation. | See response to comment 7. But to clarify, the labels should be completed by the person responsible for placement of the IDW into the container(s). |
| 9 | App D | Section II.D, second bullet under Construction Materials from demolished buildings. | Based on the age of the structures at SSFL, it is not clear why only ACM are being treated as potentially hazardous material and other building materials such as lead-based paint or light ballasts potentially containing PCBs are not. | It should be noted that there are no buildings planned for demolition as part of the ISCO work plan addendum scope of work. |
| 10 | App D | Section III.B | The text references Section I.H. Section I.H does not exist in the IDW SOP. | The misplaced reference has been corrected in the revised SOP referenced in response to comment 7 above. |